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CR-138996

MONTHLY PROGRESS REPORT
June 6, 1974
Contract NAS 9-14006
Period covered by report - May 1, 1974 to June 1, 1974

CROP STATUS EVALUATIONS AND YIELD PREDICTIONS

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Clemson University, Clemson, S. C.

A. Significant activities and results -

1. A planting of spring wheat, variety Waldron, was made May 10. After emergence, daily plant observations were initiated. It is anticipated that these data in combination with environmental records will significantly increase the scope of extremes represented by the data being collected in North Dakota this season.

2. A trip was made to points in North Dakota, Montana and Washington states to give instructions to personnel in cooperating stations for wheat growth observations and collection of environmental data; and to make spot checks of crop status at various locations during the trip. Arrangements for daily growth observations were made at the following locations:

a. Dickinson Experiment Station
Dickinson, North Dakota 58601
Stark County

A field of approximately 4 acres seeded to the variety Waldron, located conveniently to the station offices, was selected for observations. The following page is a copy of the first data sheet received from Dickinson.

b. Williston Experiment Station
Williston, North Dakota 58801
Williams County

A contour strip of approximately 20 acres seeded to Elar wheat was selected for observations. Recording pyrheliograph (Belfort Co.) instruments were delivered to this station and to Minot for use this season.

c. North Central Agricultural Experiment Station
Minot, North Dakota 58701
Ward County

The planting of both experimental and commercial fields were quite late in this area due to unusually heavy rains. The experimental plots to be used for observations were not seeded at the time of this visit. However, several small plots for other purposes were used for trial observations with the employee assigned

DICKINSON EXPERIMENT STATION
BOX 1117
DICKINSON, NORTH DAKOTA 58601

Growth rate observations - Waldron wheat - 1974 Steve Himrichs

Plant no.	May 22 8:00 AM	May 23 7:45	May 24 7:45	May 25 7:30	May 26 7:45	May 27 8:00	May 28 7:45	May 29 7:45	May 30 7:45	May 31 7:40	
1	1.6	1.7	1.8	1.9	2.2	2.3	2.6	2.8	3.2	3.2	
2	1.5	1.6	1.6	1.7	1.8	2.1	2.3	2.6	2.7	2.9	
3	1.8	1.9	1.9	2.1	2.3	2.4	3.1	3.3	3.4	3.4	
4	1.8	1.8	2.1	2.3	2.5	2.5	3.2	3.3	3.4	3.5	
5	1.9	1.9	2.1	2.3	2.5	2.6	3.1	3.3	3.3	3.4	
6	1.7	1.7	1.8	1.9	2.2	2.2	2.3	2.3	2.3	2.3	
7	1.9	1.9	2.0	2.0	2.3	2.4	2.9	3.2	3.4	3.4	
8	1.9	2.0	2.2	2.2	2.3	2.4	2.4	2.9	3.0	3.0	
9	1.9	1.9	2.0	2.2	2.3	2.1	3.3	3.4	3.6	3.8	
10	1.9	1.9	2.0	2.1	2.3	2.4	2.8	3.1	3.3	3.4	
11	1.8	1.9	2.0	2.2	2.4	2.6	2.8	3.2	3.3	3.4	
12	1.8	1.9	1.9	2.1	2.3	2.4	2.9	3.2	3.3	3.3	
13	1.5	1.6	1.7	1.9	2.2	2.3	2.8	3.0	3.1	3.3	
14	1.9	2.1	2.3	2.3	2.4	2.5	3.3	3.5	3.7	3.8	
15	1.9	1.9	2.0	2.2	2.4	2.5	3.1	3.3	3.3	3.5	
16	1.8	2.1	2.2	2.3	2.4	2.5	3.2	3.3	3.5	3.6	
17	1.7	1.8	1.9	2.2	2.3	2.4	3.2	3.3	3.4	3.5	
18	1.9	1.9	2.0	2.2	2.3	2.4	3.0	3.2	3.3	3.5	
19	1.9	1.9	2.0	2.2	2.4	2.5	2.9	3.3	3.3	3.4	
20	1.7	1.7	1.9	2.1	2.3	2.5	2.8	3.1	3.2	3.4	
21	1.9	1.9	1.9	2.1	2.3	2.4	3.1	3.3	3.4	3.5	
22	1.8	2.1	2.3	2.4	2.5	2.6	3.2	3.4	3.4	3.5	
23	1.8	1.9	2.0	2.0	2.2	2.4	3.1	3.2	3.4	3.5	
24	2.1	2.3	2.3	2.4	2.5	3.0	3.4	3.6	3.7	3.9	
25	1.8	1.9	2.0	2.1	2.2	2.4	3.3	3.5	3.6	3.6	
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to our project.

d. Washington State University
Pullman, Washington 99163
Whitman County

Tentative arrangements were made to have daily observations collected on next season's winter wheat crop. These observations will begin in the fall and continue through the winter and spring until the crop has headed, except for periods when the crop is covered with snow.

The developmental status of the current winter wheat crop on May 27 ranged from stage 6 to 7 in the area from Rosalia southward to Pullman. However, it is always difficult to determine this accurately when culms have not been marked for observation and followed throughout the season. Peas were still being planted and those already emerged ranged in development from 1 to 6 nodes. Spring oats and barley were in the 0.9 to 1.2 stage.

A listing of crop development observations during the trip, visits with Experimental Station personnel and with ASCS personnel responsible for NASA ground truth data in test sites is as follows:

Date	Location	Contact	Wheat Stage S=Spring wheat W=Winter wheat
May 21	Dickinson, N. D., Stark County	T. J. Conlon	S 1.5-2.0
May 21	Nr. Fairfield, Billings County, N. D.		S 0.5-1.5
May 21	Nr. Watford City, McKenzie Co., N. D.		S 1.0-1.5
May 22	Williston, Williams County, N. D.	E. W. French Lloyd Dahl	S 0.5-0.75
May 22	10 mile test site on highway #2 NE of Williston; 13 numbered fields inspected		S 1.3 at west end of test area to 0.5 at east end
May 23	Minot, Ward County, N. D.	B. K. Hoag	
May 23	Bowbells, Burke County, N. D.	Francis Swehla	No emergence
May 23	10 mile test site on highway #5 east of Crosby		Few fields emerged; S 0.5-1.0
May 23	Crosby, Civide Counties, N. D.	Benjamin Keys	
May 24	Highway #2 on west edge of Valley County, Montana		W 5.5 S 2.0
May 24	Nr. Gildford, Hill County, Montana		W 5.5-6.5 S 1.5
May 24	Nr. Joplin, Liberty County, Montana		S 2.5-3.5

May 24	Nr. Chester, Liberty County, Montana		W 4.5
May 24	Nr. Lothair, Liberty County, Montana		S 2.3
May 24	Nr. Devon, Toole County, Montana		S 2.5
May 24	Shelby, Toole County, Montana	William Kleinert	
May 27	Nr. Colfax, Whitman County, Wash.		W 6.0-7.0
May 27	Pullman, Whitman County, Wash.	R. E. Witters	

3. Long term weather records for North Dakota and Kansas have been received from the National Climatic Center at Asheville, North Carolina. These records are on 15 - 2400 foot (1600 BPI) magnetic tapes. Methods are being devised for transforming the necessary data into easily accessible form for subsequent analyses.

4. Evaluations of comparative growth rates of wheat, barley and rye have been in progress. These data have been partially prepared for computer analysis. Graphical presentations of these growth rates are presented on the following pages (Fig. 1 and 2). In addition to the greenhouse studies mentioned in the May 6 report, Fig. 2 shows results of a field planting in 1971-72 that had not been graphed until this time. It may be concluded from these graphs that any potential differences in plant response to environment among these crops are probably relatively small. Multiple regression analyses will provide documentation and/or prediction equations that may be tested on unrelated data.

B. Overall status and problem areas -

Progress to date is considered satisfactory with respect to the objectives of this contract.

C. Expected accomplishments during June 1974 -

1. Daily growth rate data and environmental records will be collected at the headquarters location Clemson and 3 sites in North Dakota mentioned above.

2. A study will be made of ASCS-USDA crop reports and weather records to establish a model to predict the approximate average planting date. One of the limitations of the existing spring-wheat-yield-prediction system (Haun, Agron. J. May-June 1974, appendix C NASA Headquarter's Y No. 41-001-43) is that it is applied to the same calendar period each year. In view of the fact that average planting dates for a given area vary several weeks from year to year, it would be desirable to have an initial phase of the overall model designed to establish the appropriate date for starting the growth-rate-prediction phase. Since growers generally plant as soon as soil moisture, and to a lesser extent temperature, becomes favorable it is considered possible to develop a model that will indicate the average date when this condition is reached from the progression of weather that occurs in a given area.

3. Analyses will continue on comparative growth-environment responses of wheat, barley and rye (A.4. above).

D. Recommendations and summary outlook for future work -

During the visits with ASCS-USDA personnel in North Dakota and Montana

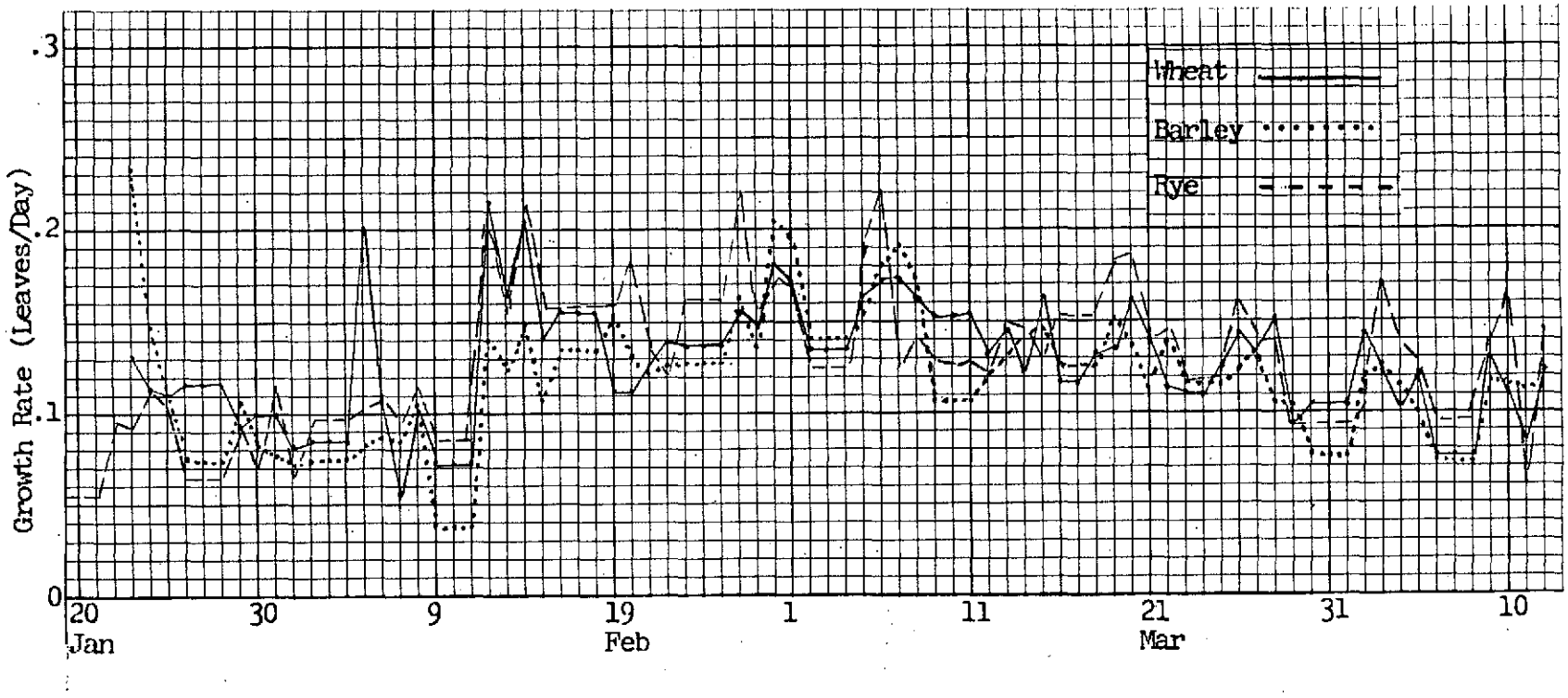

Fig. 1. Growth Rate of Wheat, Barley and Rye in Greenhouse, Clemson, S. C. 1974

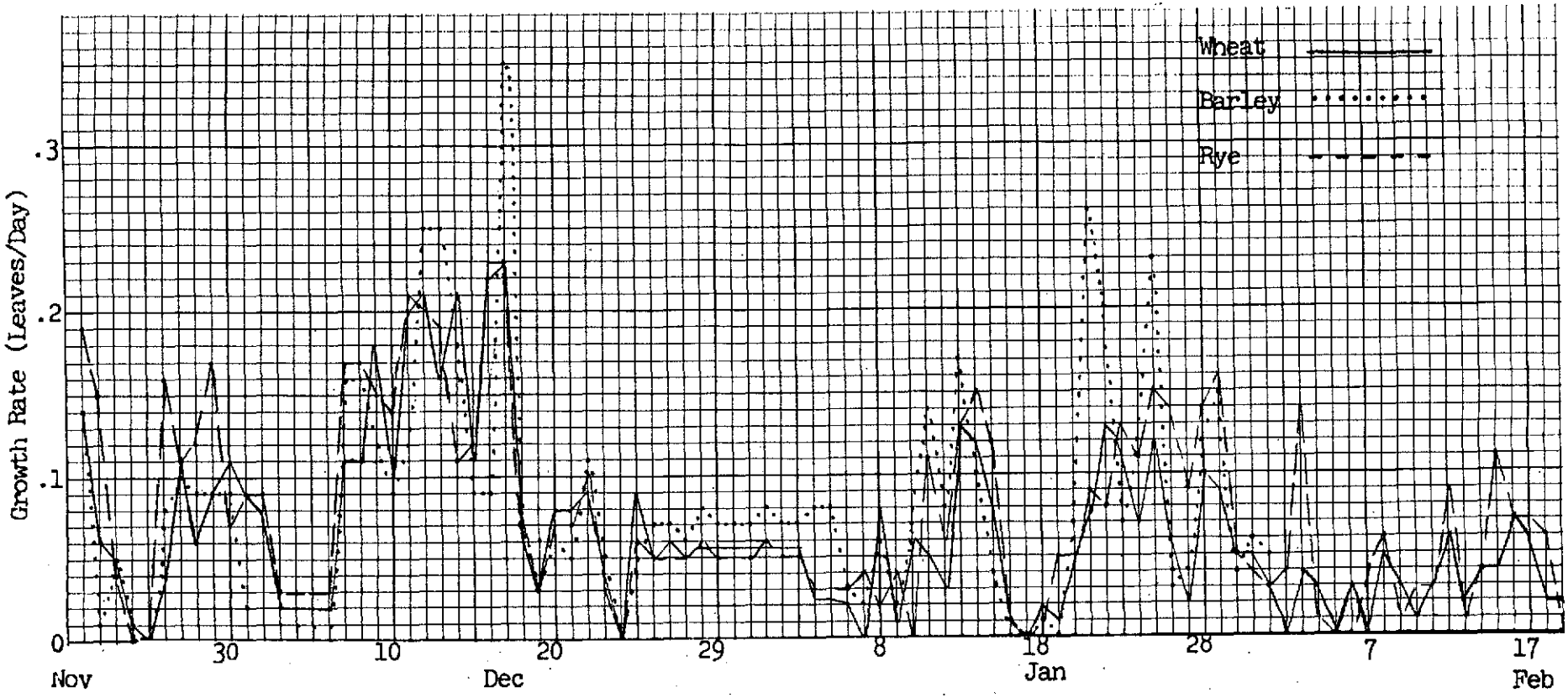

Fig. 2. Growth Rate of Wheat, Barley and Rye in Field, Clemson, S. C. 1971-72

(trip described in A above) their program for observation of the 2 X 10 mile test sites for ground truth was explained. The standardized system for recording crop acreage and status is very good. It is suggested, for future consideration, that a numerical index of crop development be added to, or substituted for the phenological stages currently being recorded. This will provide for a more linear sequence of development that can be applied to any type of numerical analysis, relative to remotely sensed crop data and/or weather data, that may be anticipated.

E. Travel summary and plans -

See A.2. above. No official trips are planned for the month of June.